

Jun 22nd, 11:00 AM - 11:15 AM

Stream Crossings II: Bridges, Culverts, Flood Resiliency, and Connectivity

Roy Schiff
Milone and MacBroom

James MacBroom
Milone and MacBroom

Jessica Louisos
Milone and MacBroom

Matthew Gardner
Milone and MacBroom

Follow this and additional works at: https://scholarworks.umass.edu/fishpassage_conference

Schiff, Roy; MacBroom, James; Louisos, Jessica; and Gardner, Matthew, "Stream Crossings II: Bridges, Culverts, Flood Resiliency, and Connectivity" (2016). *International Conference on Engineering and Ecohydrology for Fish Passage*. 20.
https://scholarworks.umass.edu/fishpassage_conference/2016/June22/20

This Event is brought to you for free and open access by the Fish Passage Community at UMass Amherst at ScholarWorks@UMass Amherst. It has been accepted for inclusion in International Conference on Engineering and Ecohydrology for Fish Passage by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.



Bridges, Culverts, Flood Resiliency, and Connectivity

Presented By

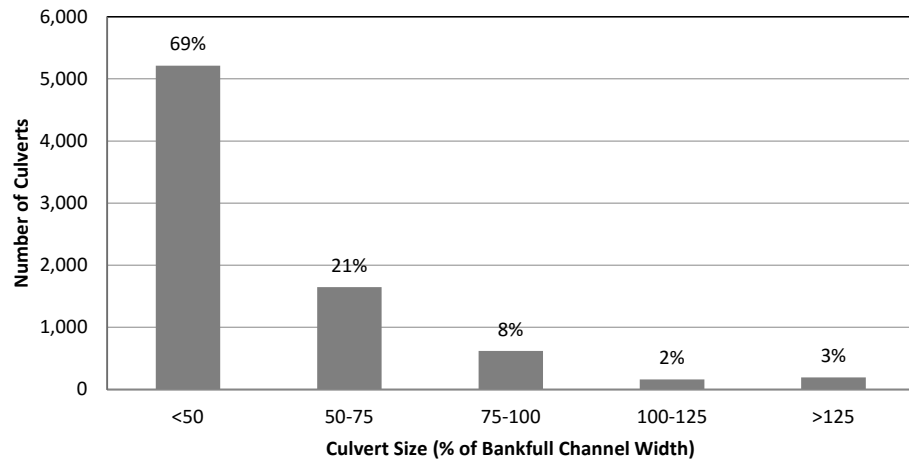
Roy Schiff
James MacBroom
Jessica Louisos
Matthew Gardner



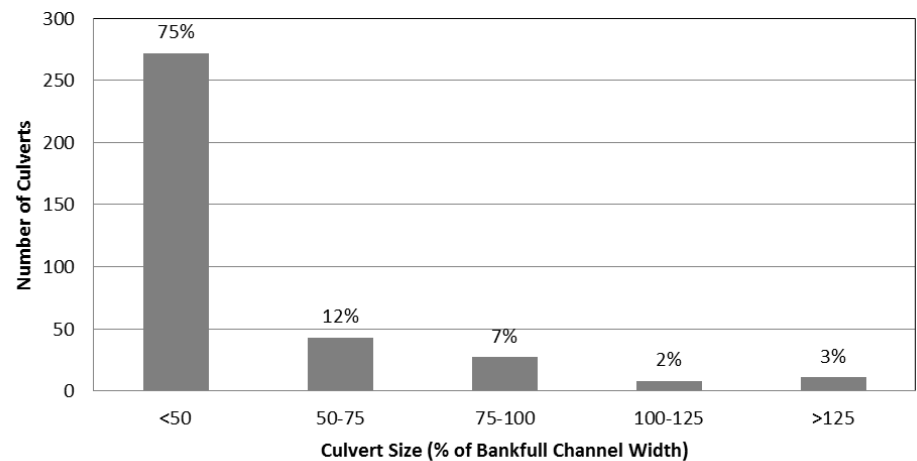
Fish Passage 2016 – International Conference on River Connectivity | June 22, 2016

Undersized Culverts

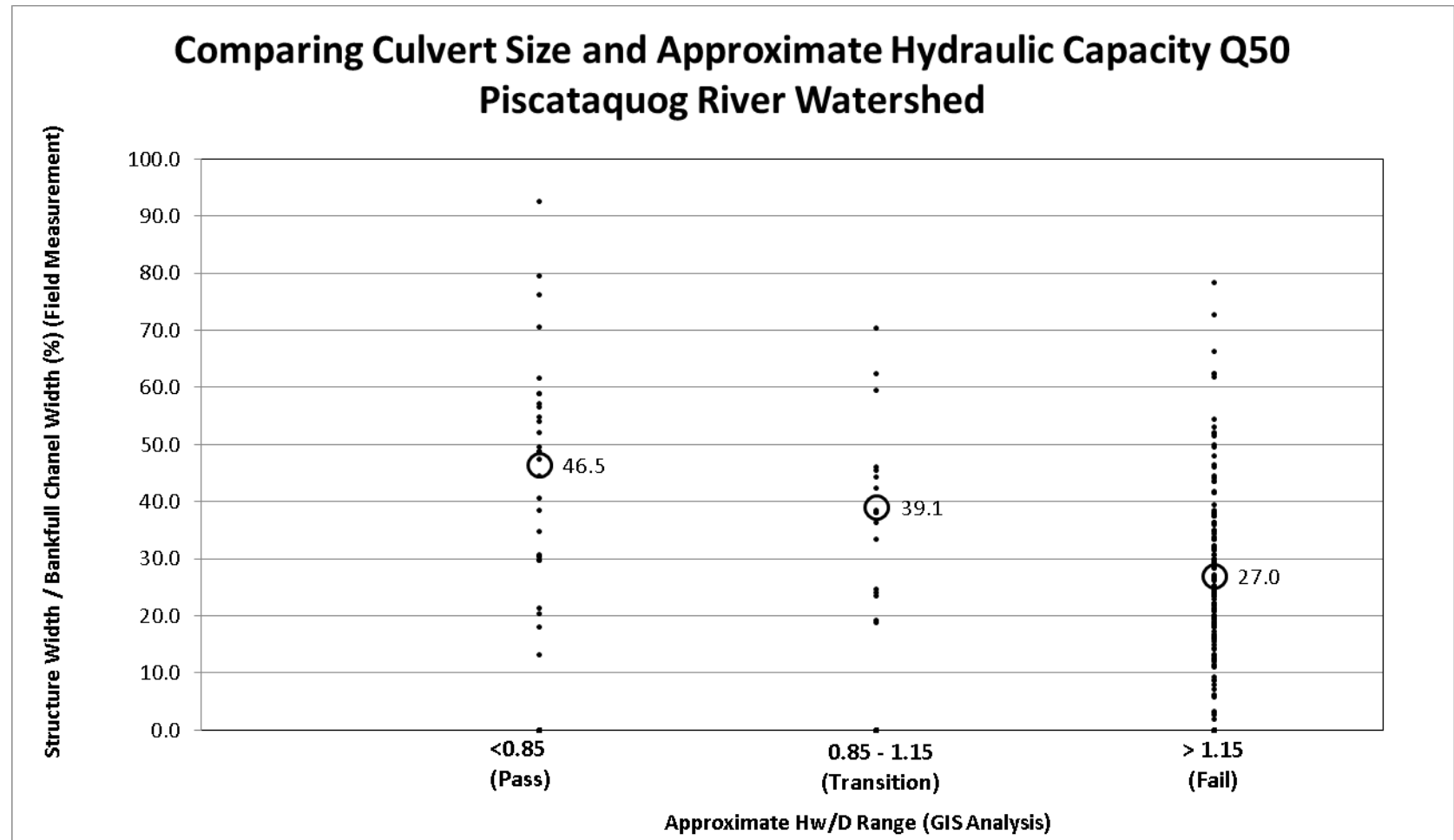
**Culvert Sizes
(~7,500 VT culverts)**



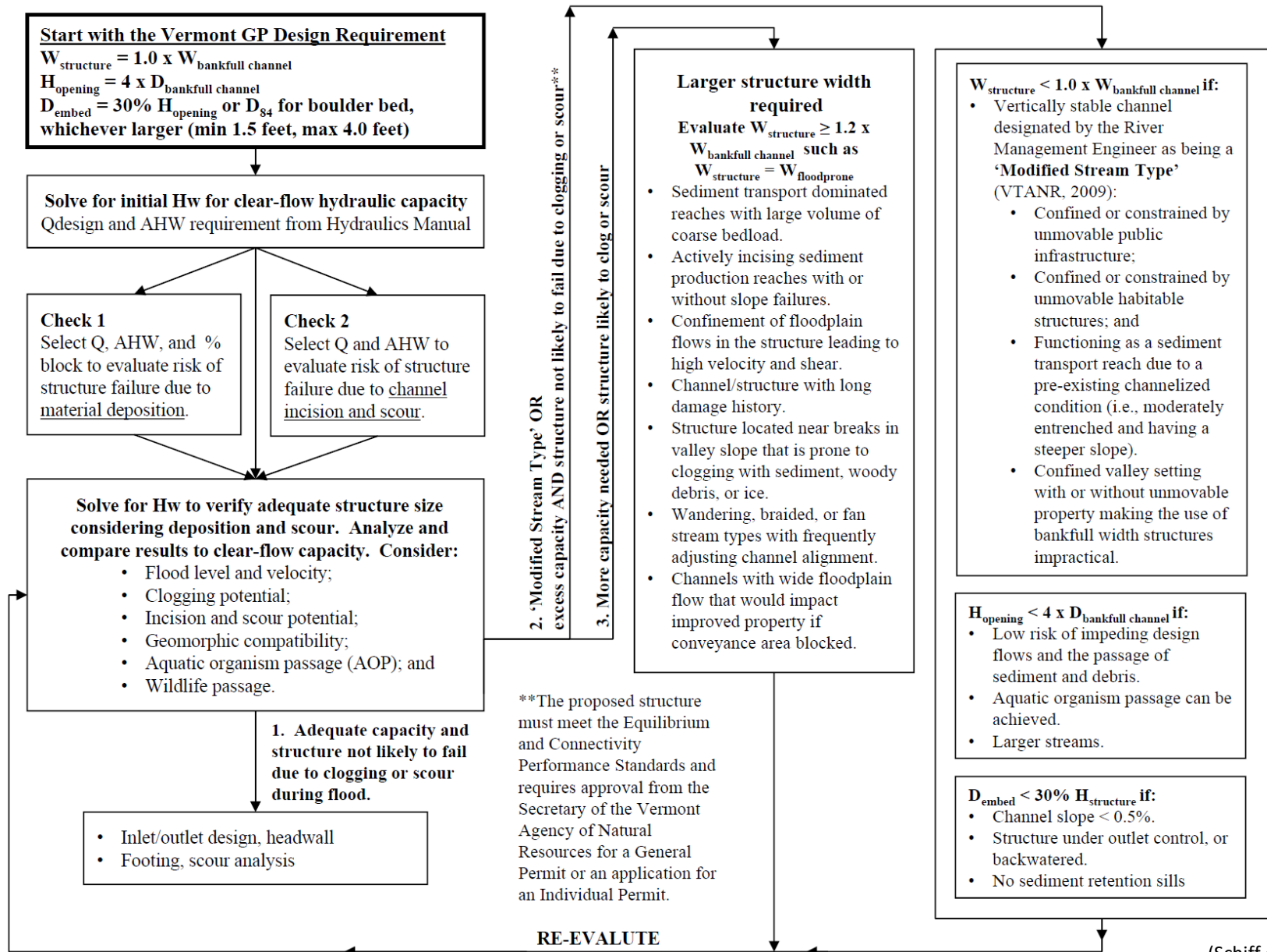
**Piscataquog River Watershed Culvert Sizes
(~361 culverts)**



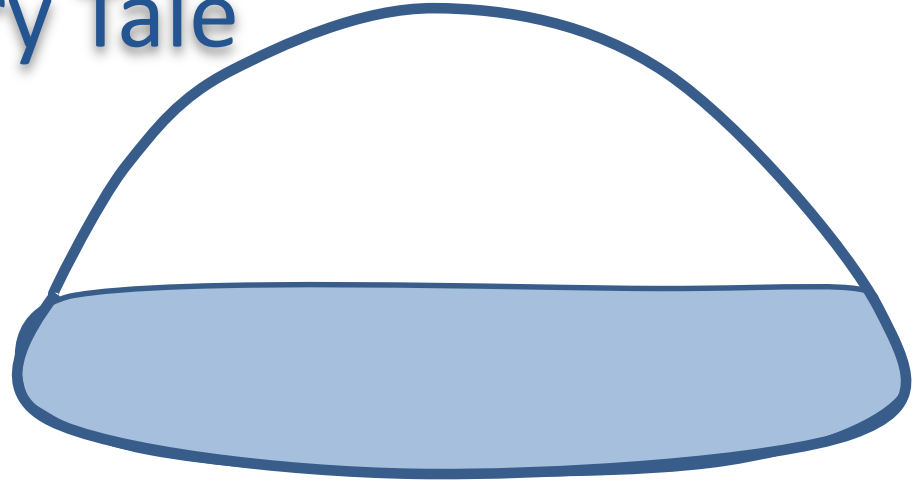
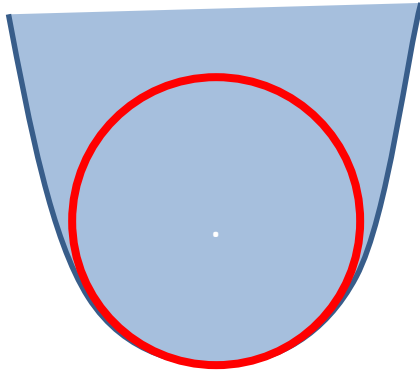
Undersized Culverts



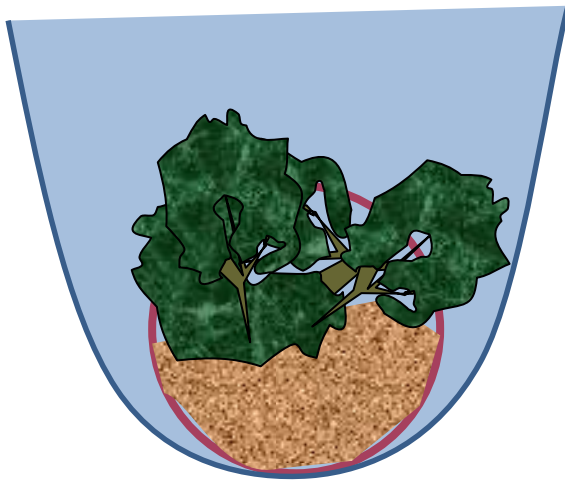
Recent VT Design Guidance & State Standards



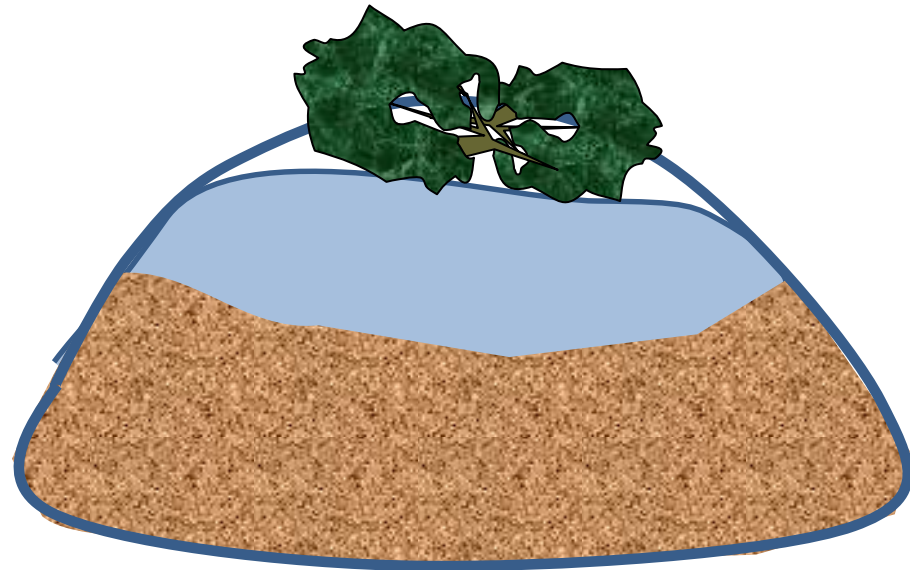
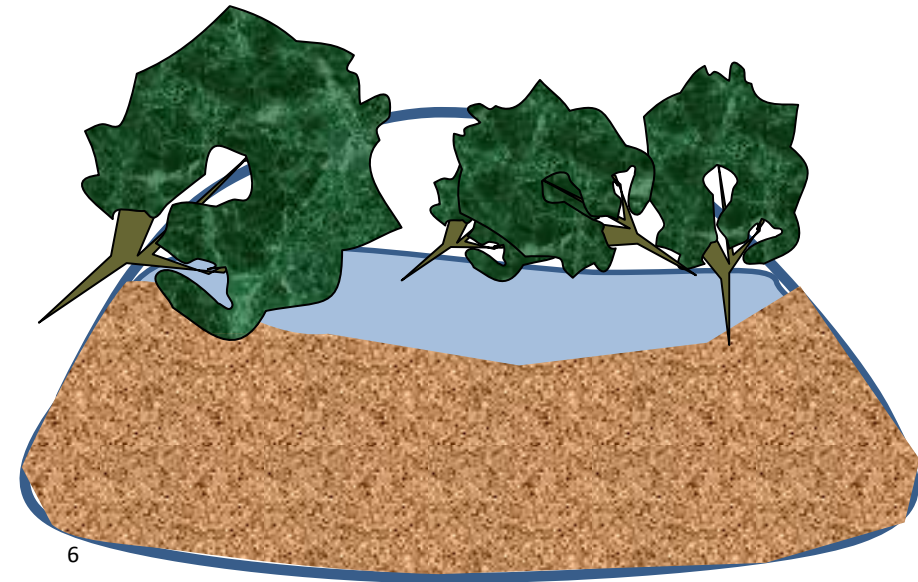
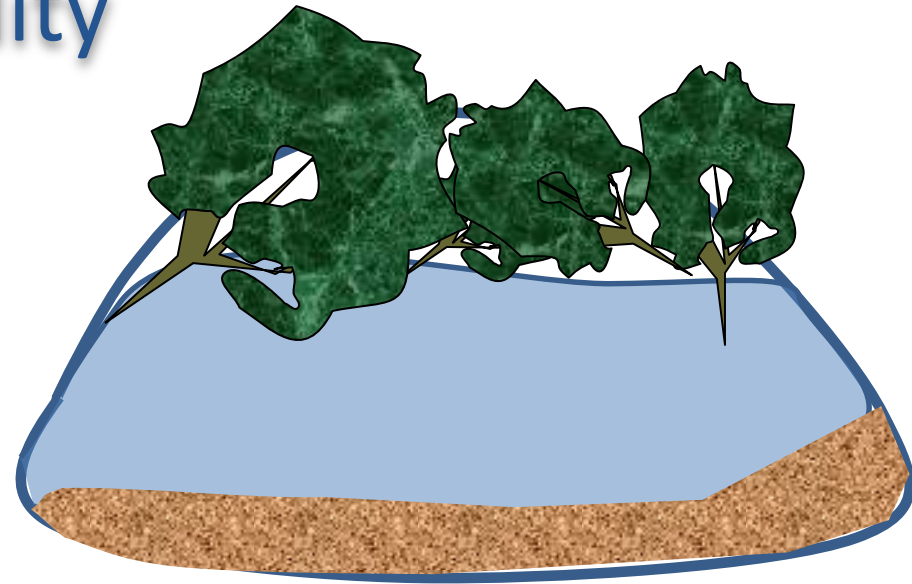
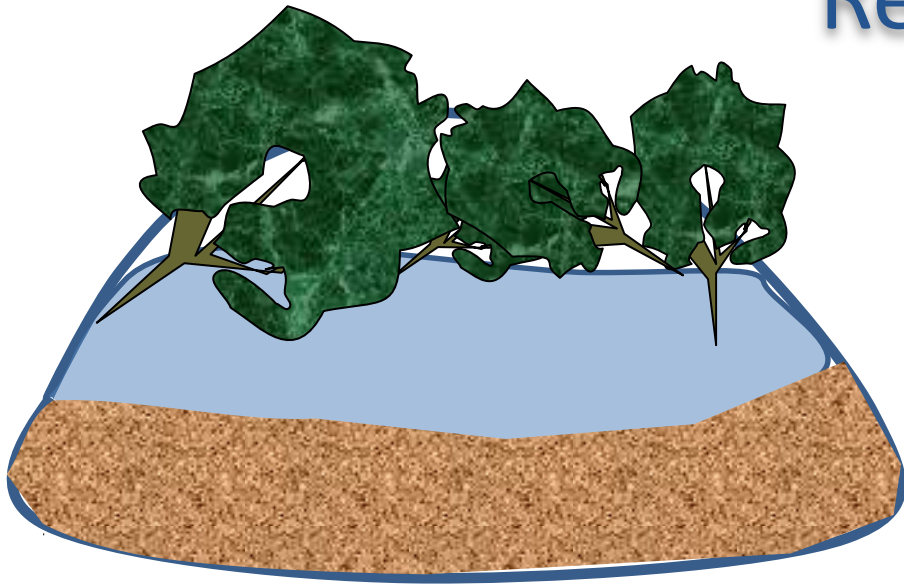
The Clear Flow Fairy Tale



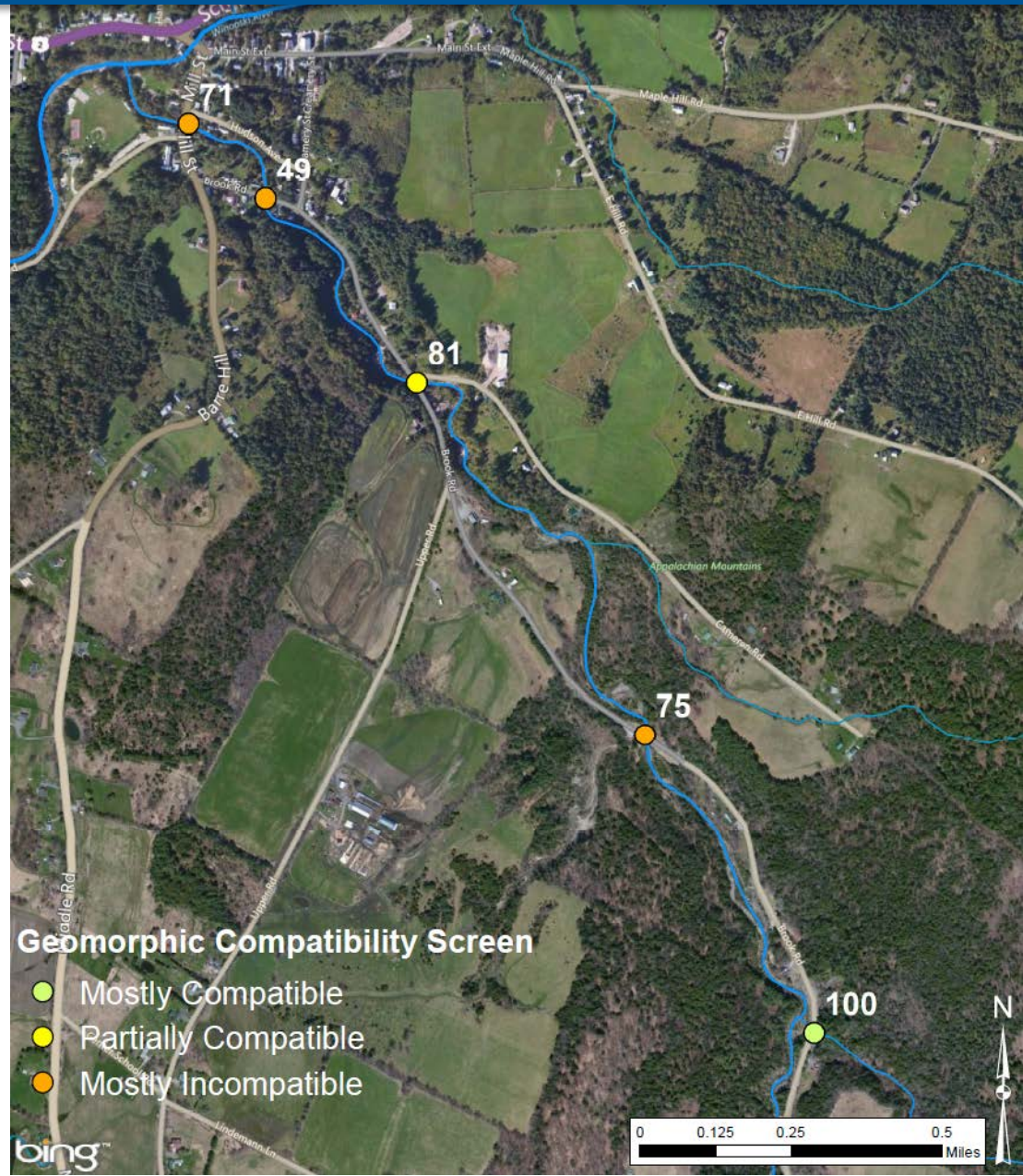
The Large Wood and Sediment Reality



The Scary Part of Reality



Undersized Bridges



Large Wood at Bridges



© fotogosauros.wordpress.com

Great Brook
Brook Road in Plainfield, VT
7/19/2015
Photo taken by B. Towbin

Great Brook
Brook Road in Plainfield, VT
5/27/2011
Photo taken by G. Springston



UVM Large Woody Debris Study

June 25, 2015

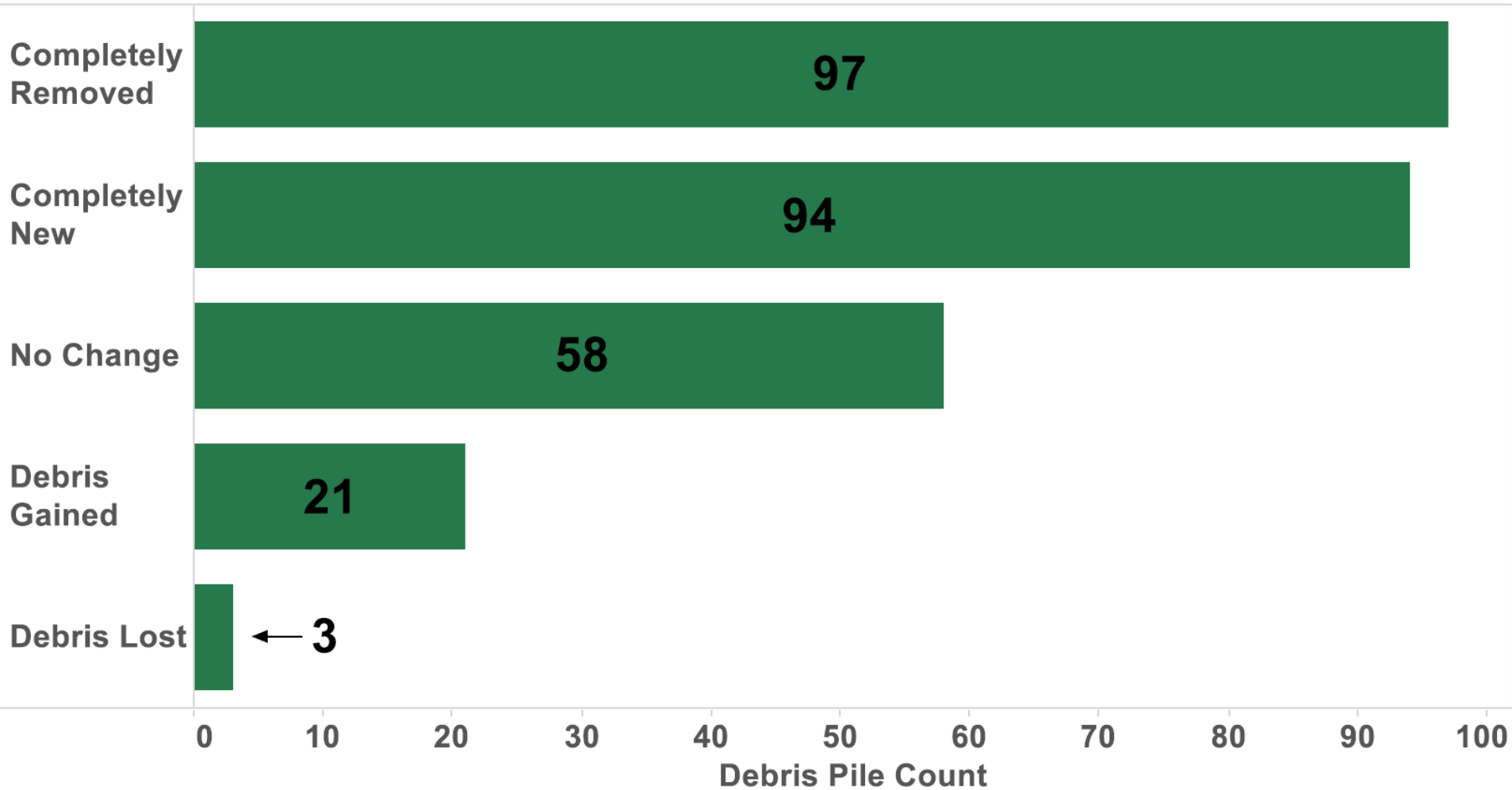


July 21, 2015



UVM Large Woody Debris Study

Small Pile: 1-5 Trees



Poor Bridge Alignment

Roaring Brook
US Route 4 in Killington, VT
Photo by Lars Gange &
Mansfield Heliflight, August
31, 2011)





New Hampshire

Highways

APRIL-JUNE 2016

Magazine of the N. H. Good Roads Association

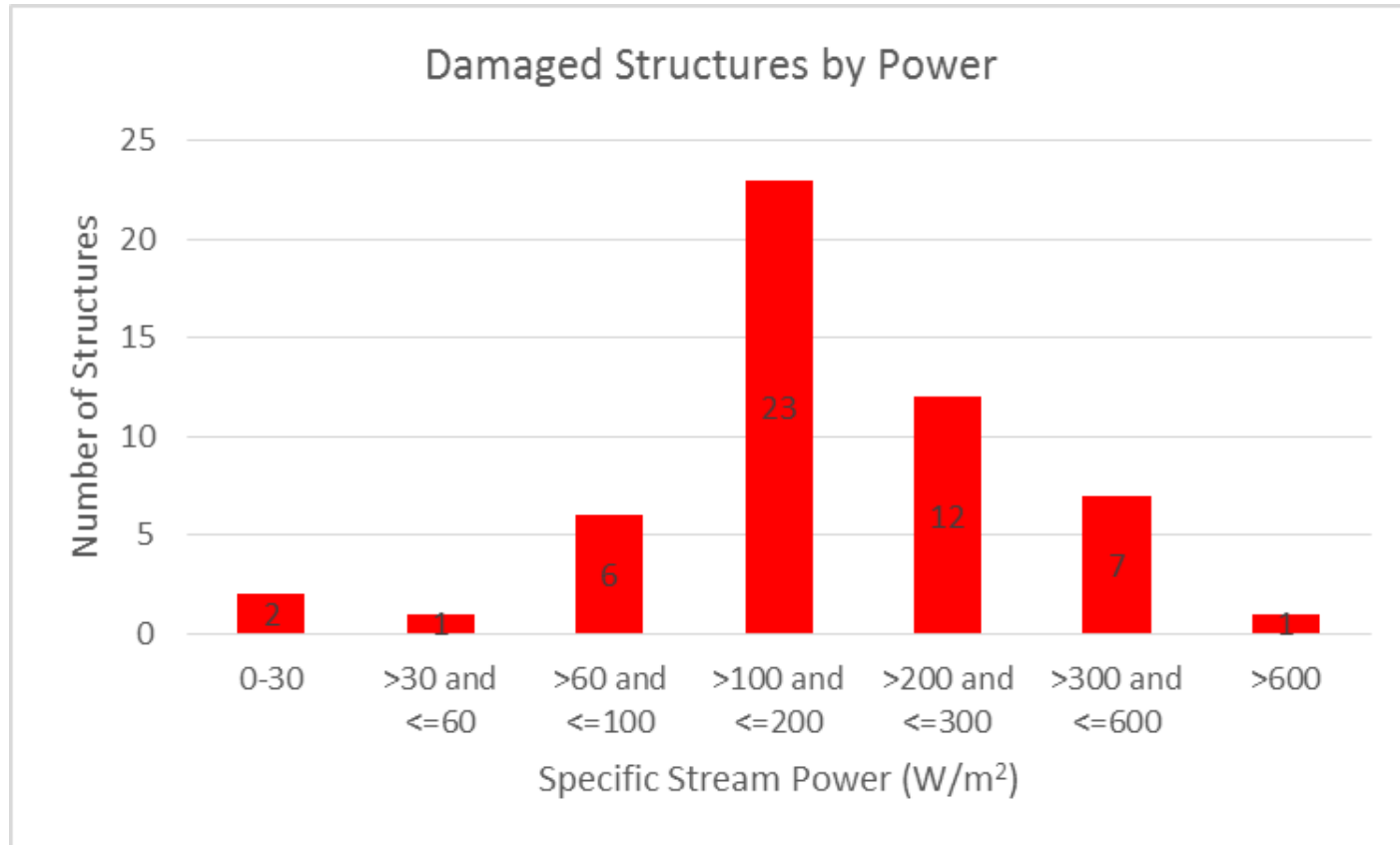
Getting ahead of the storm...

**Developing a tool that helps
road officials prioritize
culvert repair or replacement**



Chris Cornog

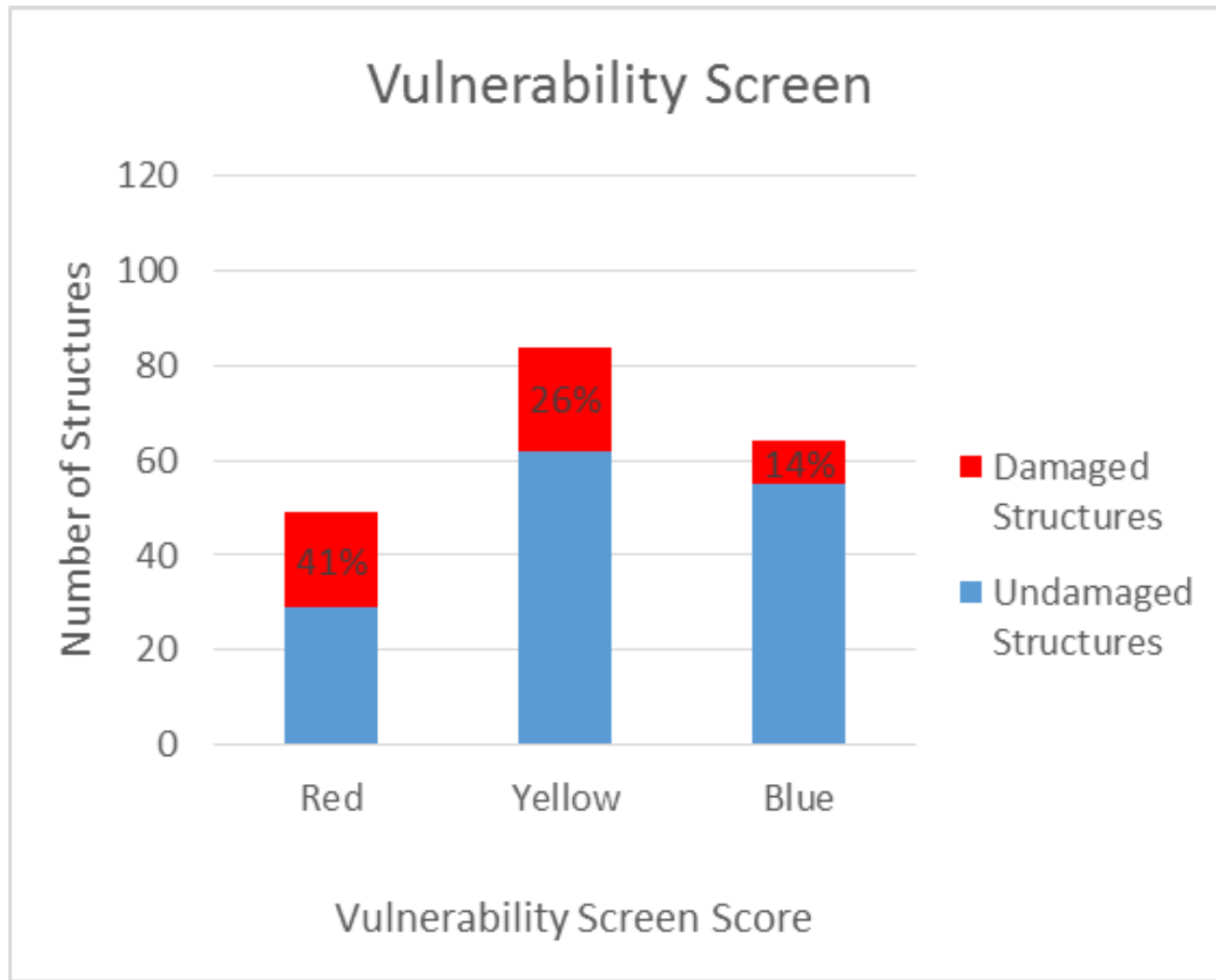
MA Culvert Vulnerability Screening



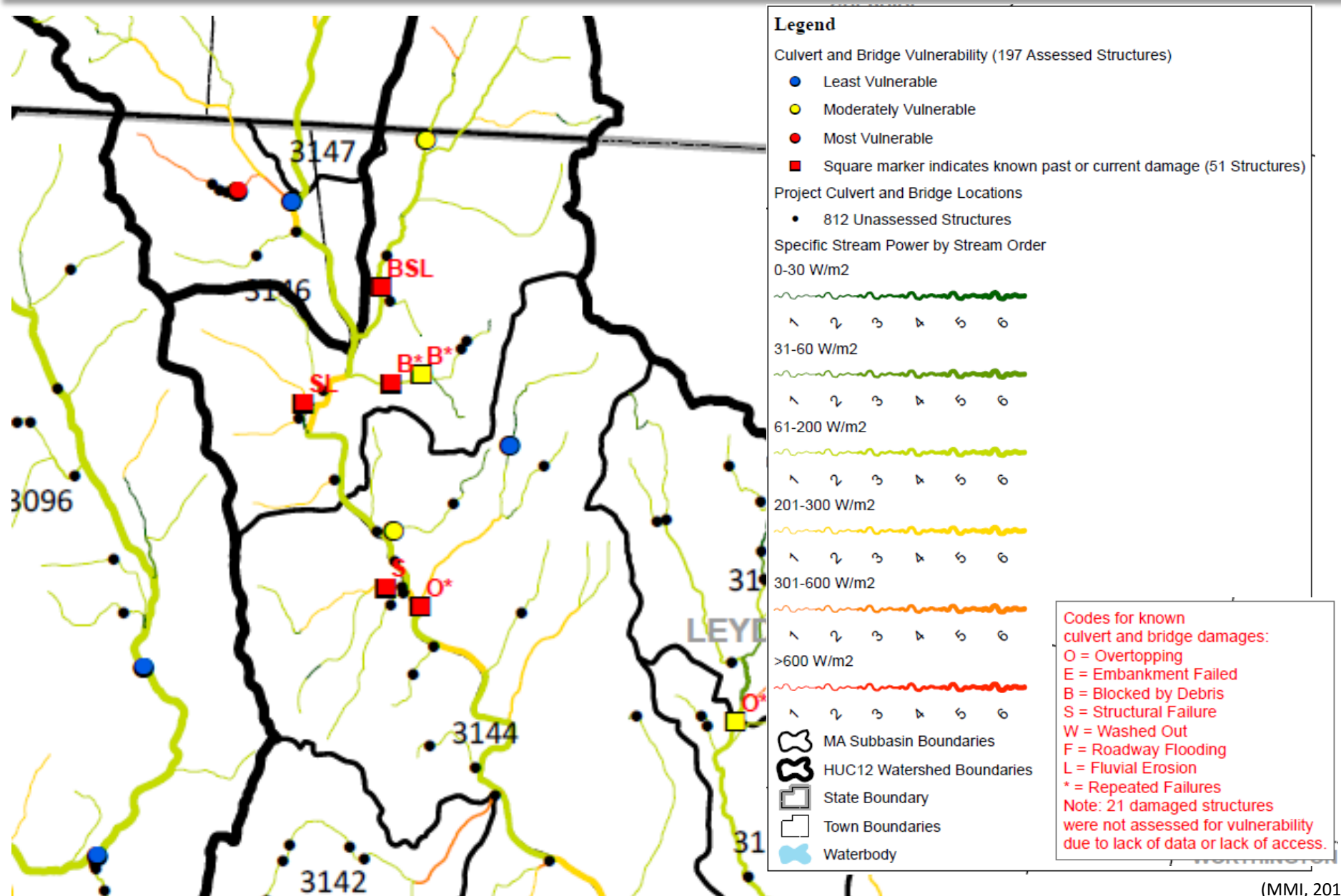
Specific Stream Power versus Bed Resistance

		Dominant Particle Size (Bed Resistance)					
		Silt	Sand	Gravel	Cobble	Boulder	Bedrock
Specific Stream Power (W/m^2)	0-60	3	3	2	3	4	4
	60-100	3	3	0	1	3	3
	100-300	3	2	0	0	2	2
	300+	2	1	0	0	1	2

MA Culvert Vulnerability Screening



MA Culvert Vulnerability Screening

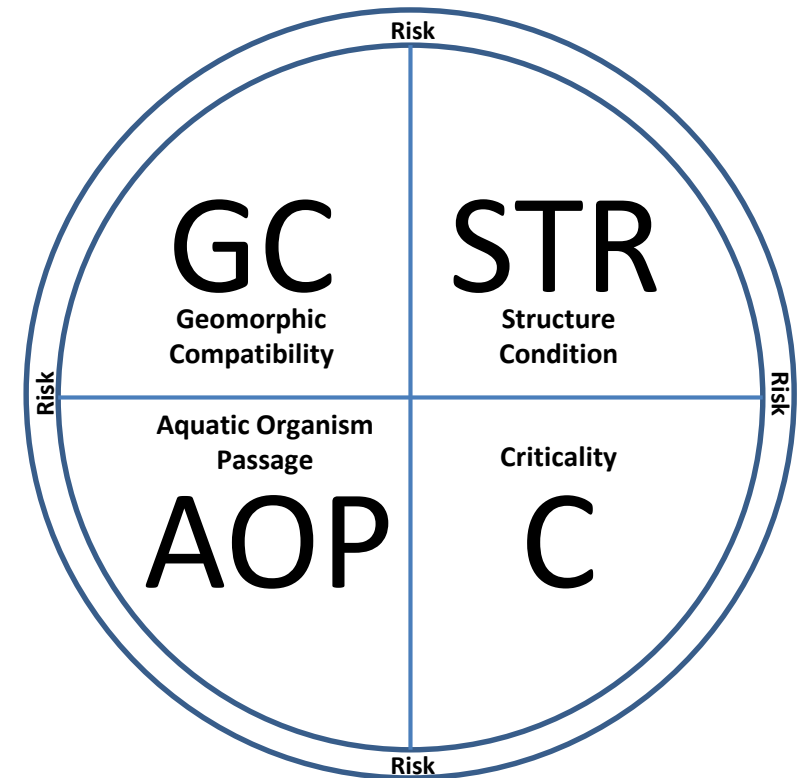


NH Draft Screen

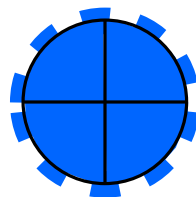
Draft Culvert Scoring System (V.5)



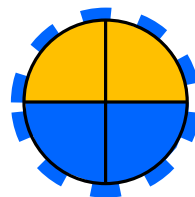
Variable	Base Screen	Enhanced Screen
GC (Geomorphic Compatibility)	NH Geomorphic Compatibility (NHGS)	GC + Specific Stream Power and Approximate Bed Resistance
STR (Structure Condition)	Structural Condition	STR + Approximate Hydraulic Capacity (TU/SNHPC)
AOP (Aquatic Organism Passage)	NH Aquatic Organism Passage Screen (TU/SNHPC)	AOP + Fisheries Prioritization (NHFG)
C (Criticality)	NHDOT Road Class	Road Class + Public Safety Proximity + Locally important conditions (for locally enhanced screen)
R (Risk)	$R = f(GC, STR, C)$	$R = f(GC, STR, C)$



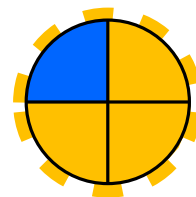
Risk Icon Examples



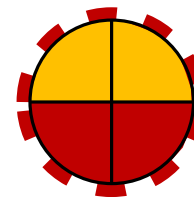
Lowest Risk



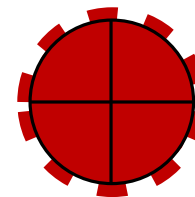
Low Risk



Moderate Risk

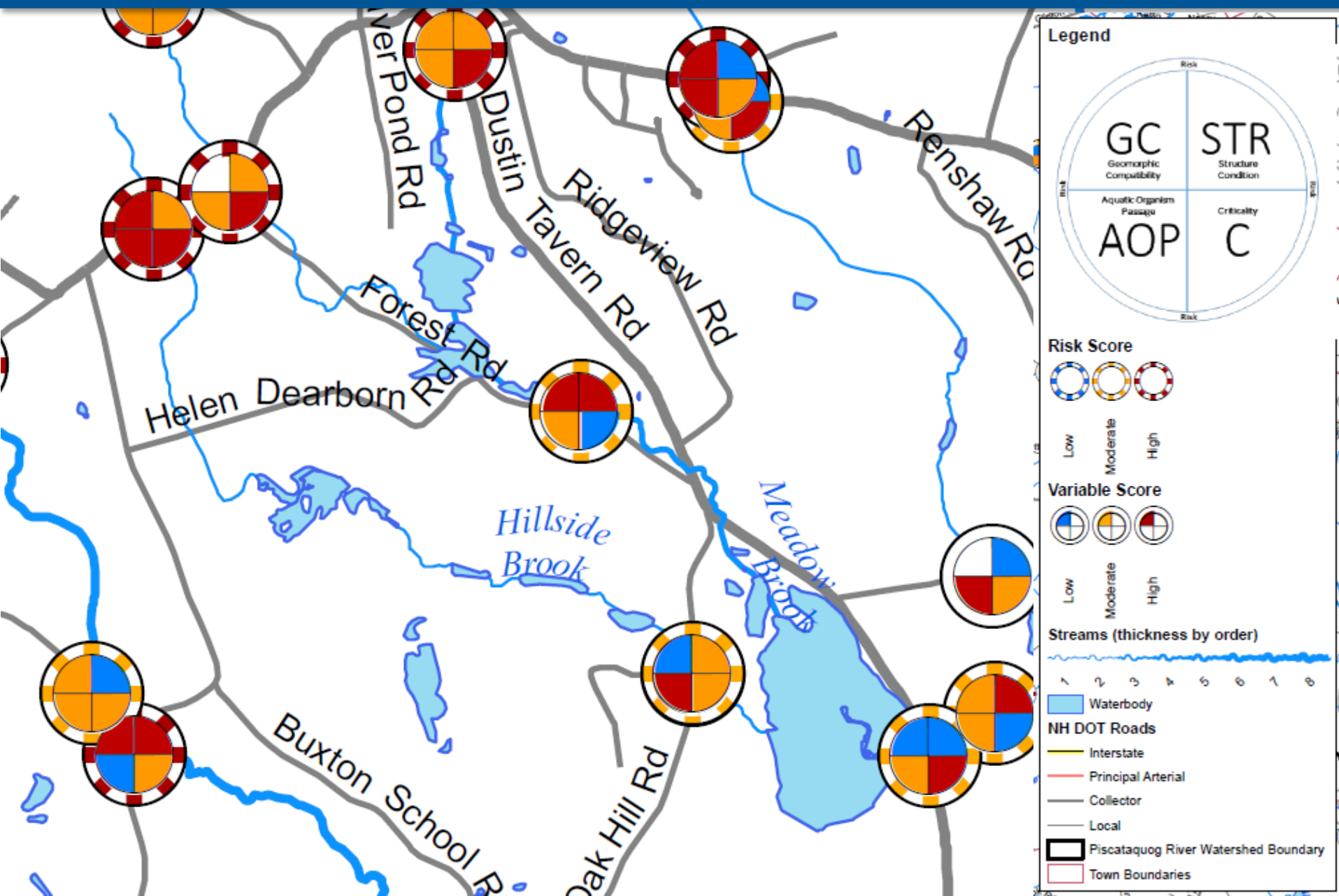


High Risk



Highest Risk

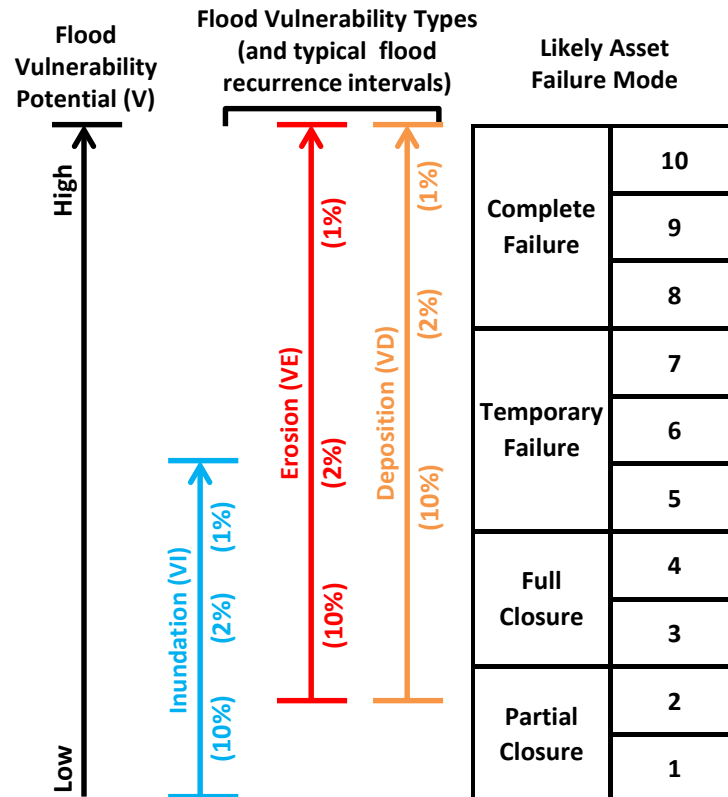
NH Draft Screen Results



VT Road Vulnerability Assessment

$$\text{Vulnerability} = \sum_{I,E,D} V_{\text{ROAD SEGMENT}} = \sum_{I,E,D} (V_{\text{EMBANKMENT}} + V_{\text{BRIDGES}} + V_{\text{CULVERTS}})$$

where I = inundation, E = erosion and D = deposition



THANK YOU.



← Former culvert



New culvert →

HIGH RESILIENCY = HIGH CONNECTIVITY